# **Japanese beetle Eradication 2007**

#### Introduction

The Japanese beetle (*Popillia japonica* Newman) is a potentially serious threat to Utah's \$124 million nursery and floriculture economy. Trapping protocols and the actions taken in association with the eradication effort are necessary to maintain Utah as a Category 1 Uninfested/Quarantine Pest state in compliance



with the U.S. Domestic Japanese Beetle Harmonization Plan. Extensive statewide detection and localized delimiting trapping indicate that the Japanese beetle infestation first discovered in Orem City in July 2006 is localized in that city in a largely non-agricultural residential area.

Japanese beetle (JB) was introduced into the United States in New Jersey in 1916. With no natural predators or parasites to control the population, JB has spread throughout most of the states east of the Mississippi with pockets of infestation in states further west. Adult beetles are voracious, often aggregate feeders, with a known host range of over 300 species of plants (polyphagous). Adults feed on fruits, flowers and leaves. Leaf feeding is characterized by the resulting skeletonized appearance. The larval stages preferentially feed on grass roots and can cause extensive turf damage. Management and control of this widespread pest is estimated to cost the turfgrass and ornamental industries approximately \$450 million annually (Potter and Held 2002).

Extensive public outreach efforts preceded the May 17, 2007 declaration of a state of emergency according to the Insect Infestation act (Utah State Code 4-35-1 through 4-35-9). Eradication treatments began June 1, 2007 with turf application of Merit 2F (imidicloprid) to the approximately 480 acre treatment area. Two foliar treatments of Tempo® Ultra SC (beta-cyfluthrin) were applied to 250 acres in July. A third foliar spray was done in three areas identified by the higher number of trap catches as "hot spots." Carbaryl 4L was applied to food crops. Arena® 0.25G (clothianidin) was applied to turf in August to small areas to augment late season larval control.

Trapping levels were increased more than 400% statewide and over 600% in Utah county, including the delimiting grid in Orem. Trap catches began in mid-June and continued to the end of September totaling 2,153 beetles. No beetles were found outside the Orem City area.

#### Outreach 07

Important to the success of the eradication program was the development and initiation of a public outreach and education campaign. Internet websites, public meetings, and door to door canvassing were utilized to improve residents' understanding of the potential long term impact of the infestation on the agricultural industry of Utah and of the economic impact on their own lives with increased cost of landscape maintenance due to damage by JB.

Both the Utah Department of Agriculture and Food (<a href="http://ag.utah.gov">http://ag.utah.gov</a>) and the City of Orem (<a href="http://www.orem.org">http://www.orem.org</a>) added JB information links to their websites. Press releases, pesticide and beetle fact sheets, maps of the treatment areas and green waste disposal changes to the impact area were included and updated as implementation planning evolved. Copies of Permission slips and Sworn Affidavits Not to Treat were available to download.

Public meetings were scheduled for each of the three neighborhoods identified in the treatment area. These were held in the evenings on March 15, 2007 at the Geneva Elementary, March 20 at Suncrest Elementary and March 22 at Orem Elementary. All meetings were very well attended with the March 17, 2007 edition of the Daily Herald, a locally published newspaper, reporting an estimated 600 people crowded into the first meeting. Background information on the Japanese beetle and the planned spray treatment was presented with question and answer opportunities following. Written comments and questions were solicited to assist UDAF in preparing staff and volunteers to address the most frequently asked questions and concerns. Permission slips were distributed for residents to sign, granting UDAF the opportunity to treat residential property.

Door to door outreach began in mid April. All outreach and notification literature was printed in English and Spanish. On April 18, Outreach Volunteer training was held in Provo, Utah, to familiarize the approximately 25 volunteers, primarily Master Gardeners, with the information and goals

of the program. On Saturday, April 21, volunteers joined UDAF staff to go door to door to distribute information, answer questions and collect signed permission slips. This effort continued for the next two Saturdays, and during the weeks of May 1 and May 8. Volunteers donated over 100 hours of time to the project. Ultimately, over 50% of homeowners signed and greater than 95% of the treatable acreage was voluntarily available for treatment.

Preceding the press release of the May 17 Declaration of a state of Insect Emergency by UDAF Commissioner Leonard M. Blackham, 2,400 letters were mailed to impacted Orem residents containing a copy of the Official Notice of an Insect Infestation Emergency Declaration, a letter from Commissioner Blackham and a letter from Orem City Mayor Jerry Washburn. Within The Insect Emergency Utah code 4-35-7, there is a section that provides residents with medical concerns the opportunity to prohibit spraying by providing a signed affidavit from their physician. It also requires the use of one of the UDAF approved alternative treatments, halofenozide, applied in mid July or *Heterorhabditis bacteriophora*, a parasitic nematode. This provision was utilized by very few individuals and most readily participated in the use of the alternative treatments.

#### **Treatment**

As indicated in the Declaration of insect emergency, pre-treatment notification was provided to residents 48 - 72 hours in advance of the planned spray day. Notification contained the Official Notice of scheduled treatment with date, approximate time of day, and before and after treatment instructions. Pesticide fact sheets covering materials to be applied were also included. Information was distributed in UDAF letterhead envelopes, stamped Official Notice and labeled with the scheduled treatment date. To insure each resident was notified, packets were hung on the front door of each home. As in the outreach effort, all literature was bilingual.

Turf and planting bed treatment with Merit ® 2F began on June 1, 2007 (Appendix 1). UDAF staff, preceding the applicators, knocked at each residence and, in most cases, left an After Treatment Notice on the door. The door hangers reiterated the chemical applied, the date and approximate time and any after treatment steps required. UDAF staff would inspect the yard for readiness and move toys or other items as needed. After treatment, the standard True Green Chemlawn placard was placed on the property.

Written records were maintained with address, date and time. Locked gates and loose dogs were the most commonly encountered obstacles. In these cases, missed treatment notices were left with instructions to call and reschedule.

Night applications were made to commercial areas and medical buildings to reduce interference with customers and patients. Extra planning was involved for the two children's day care facilities located in the impact area. UDAF worked closely with day care staff to adequately prepare the sites for treatment. Saturday night application allowed sufficient time for day care employees to water the product into the soil, remove protective barriers and replace equipment moved off of the turf before the children began to arrive Monday morning.

Large expanses of turf were treated with Merit® 0.5G, a granular formulation. The product was applied using a turf tractor at a rate of 80 pounds to the acre. These treatments were done at night to lessen the impact on the recreational use of the areas. Arrangements were made with the responsible parties to water the product in as soon as was feasible.

Turf treatment was finished on June 18 with a mop up of missed properties on June 21. The Merit® 2F treatment encompassed 480 acres and 2,200 residences requiring the use of 5 trucks per day. Merit® was mixed at 1.25 pints per 100 gallons of water, resulting in the application of 0.39 lbs. of active ingredient (A.I.) per acre. Tank samples were taken by UDAF, Pesticide Investigator, during the course of treatment to verify concentration.

Foliar treatment began on July 5, 2007 and consisted of two treatments, Tempo® SC Ultra on above ground ornamental foliage and Carbaryl 4L on food bearing crops (Appendix 1). Tempo® is not labeled for use on food crops. To insure the correct chemical was applied to the appropriate plants UDAF staff scouted the foliar treatment zone and flagged fruit trees, vegetable gardens, berry patches and grapes. Red flagging tape was used to mark crops with a spray interval of 7 days or less. Yellow tape was used to identify apples and pears which require a 14 day spray interval. Because carbaryl has a short tank life, fresh product was mixed at least every 4 hours to maintain efficacy. Four spray trucks were loaded with Tempo® and two trucks were available for carbaryl application. Tempo® was applied at a rate of 5.4 ounces per 100 gallons. Carbaryl was mixed using 32 ounces per 100 gallons. Tank samples were taken during the course of treatment to verify concentration.

The same pre notification and door to door day of treatment protocols were used during the foliar spray as had been used during the turf treatment. Special care had to be taken to watch for open windows in the area of treatable foliage. Night applications were done on public grounds and around medical facilities. Day care centers were also treated at night as were private homes directly bordering the day care properties.

The first foliar treatment began on July 5 and was completed on July 11. The second foliar spray applications began on July 12 and were completed on July 18. A third foliar treatment was done on July 25 to the three areas with the greatest number of adult beetle trap catches. Trap data clearly indicated that these three areas maintained a concentrated JB population supported by ample host material and well maintained expanses of turf. The foliar treatment area involved about 250 acres and 1,200 residences. Carbaryl application was required on 430 of the properties.

The discovery of a small population northwest of the treatment area required a late season larval control treatment. On August 10, 2007, Arena® 0.25G (clothianidin), was applied to the turf along 1200 West between 776 North and 537 North. Arena® was also applied to about 4.5 acres of turf on hospital property at 300 N 400 West. This area continued to show a high number of trap catches throughout the season. Turf tractors were used to apply the product at 135 lbs per acre.

## 2007 Japanese beetle Trapping Program

The JB infestation in Orem resulted in significantly increased trapping efforts throughout Utah. In previous years, approximately 500 traps were placed statewide. With the discovery of an established population, statewide trapping increased from 500 to 2,993, the bulk of which were placed in Utah County (Appendix 2). In Utah County, 695 delimiting traps covering an area of roughly 9 square miles were baited with a dual lure and placed in a 250' grid centered in the 2007 treatment area. The 250' grid was surrounded by a 500' grid located in and on the periphery of the 2007 treatment area. The 500' grid was surrounded by a 1000' grid which occupied Orem City and small parts of Lindon and Provo City. Throughout the rest of Utah County 5 traps per square mile were placed and maintained. A total of 695 delimiting traps and 725 detection traps were maintained in Utah County in 2007. The 250' and 500' delimiting grids were checked twice a week from

June 15<sup>th</sup> through the 3<sup>rd</sup> of September. Detection traps in Utah County where checked twice a month. Traps throughout the rest of the state were placed at the rate of 2 per square mile in areas suitable for JB introduction and establishment. These traps were checked monthly. The gender of 2,097 trapped beetles was determined through microscopic examination of the morphological differences in the forelegs. The overall sex ratio of beetles recovered in the treatment area was 2.4 males to 1 female. During the period from August 9 to August 30 the average ratio changed to 1.06 males to 1 female beetle.

### **Summary of Pollinator Survey using JB Trap By-Catch**

The UDAF Insect Program serves Utah agriculture and forestry by protecting crops, range and forest but all Utah residents receive a quality of life benefit from minimizing insect damage. In designing the insect programs, it is a UDAF priority to minimize non-target impact on the environment, ecosystems and beneficial insects. The JB eradiation project utilizes traps and chemicals, both of which may impact beneficial insects. The floral component of JB trap lure is attractive to pollinators, and thousands have been caught in these traps. This presents an excellent opportunity to survey pollinator populations. UDAF has partnered with the USDA, Agricultural Research Service, Pollinating Insect-Biology, Management, Systematics Research Lab in Logan, Utah, to identify and count these pollinators. This information will be collected each year as a census database and may be used in future long term studies of population fluctuation, species identification and to study the impact of treatment programs or habitat changes. Cooperators include USDA Research Entomologists Drs. James Strange and Terry Griswold.

## 2008 Orem City Japanese beetle Eradication Program

#### Outreach 2008

The 2007 Declaration of Insect Emergency provides UDAF a new opportunity for continuing outreach education. Because the declaration is still in effect, outreach efforts will concentrate on reporting activity and results from the 2007 treatment program. Community Open Houses will be conducted with industry representatives available to answer questions, clarification of vegetable garden and fruit tree policy and improving the pre application notification process.

Many Orem City residents are interested in the results of the 2007 JB program. Results will be published and mailed to each address in the JB treatment impact area. These documents will cover the 2007 activities of the program, including treatment, trapping and anticipated results. New 2008 treatment boundaries, planned treatment and trapping activities and estimated beginning and ending spray dates will be included. This mailing will take place prior to the Open Houses to allow residents to read the material and formulate questions they may wish to have answered.

An Open House format was determined by the JB Decision and Action committee as the most effective means of answering the wide range of questions expected. UDAF will have staff available to help residents determine if they are in the treatment area, to answer questions pertaining to treatment and trapping activities and any other query within its scope. UDAF staff may then help direct residents to the specialists available and best able to answer their questions. Utah State Extension personnel have agreed to be on hand to respond to horticultural and gardening questions and chemical company representatives will provide information on the treatment chemicals chosen for use. These events are planned for the evenings of Thursday, February 21 and Tuesday, February 26, 2008. The locations have yet to be determined, but will be within the 2007 treatment area.

Key to maintaining good relations with treatment area residents is adequate pre notification of scheduled spray dates. Though little preparation is required for the safe application of these chemicals, many people choose to take extra precautions to assure themselves of the welfare of their family and pets. A study published in the Journal of Pesticide Safety Education (Vol. 2, 2000) reported that 80% of parents of school age children preferred to be notified prior to any pest management activities done within the school building. While not directly on point, this study supports what was observed during the 2007 JB treatment. People want to know what is going on and want to have adequate time to prepare.

Advance notification materials will be simplified to streamline the process. Fact sheets about the treatment chemicals to be used will be provided in the late winter mailing and available at the open house. Pre treatment notifications will likely be hand delivered which offers the greatest degree of flexibility in planning and insures timely notice reaches each address. A simple bilingual door hanger will provide the scheduled date and time, the

chemical to be applied and any before treatment steps required. After treatment information will be provided as in 2007.

#### Treatment 2008

#### Introduction

Due to the highly polyphagous nature of Japanese beetle (JB), areas have been selected to target for treatment as opposed to individual host plants. Treatment areas are determined by the number of beetles found in a trap. Areas that showed 2 or more beetles per trap in 2007 will receive both turf and foliar treatments. Increased trapping will be implemented in areas where 1 beetle per trap occurred in 2007. Catches in these traps will alert UDAF to potential JB populations that may require localized treatments.

The number of beetles found in each trap were recorded and then analyzed by ArcMap Spatial Analyst with inverse distance weighting (IDW). The product of IDW analysis is a map showing the probability of a JB occurring within a given area (Appendix 3). Because JB were found solely in the 250' and 500' grid only that data was used in the IDW analysis. The resulting probability map is used to determine the 2008 treatment area (Appendix 4). The inclusion of a 250' grid within the 500' grid more clearly defined the areas of highest JB population. This analysis is the basis for 2008 recommendations.

This is a suggested prioritized list of areas to be treated.

## Tier1: High Probability of JB Occurrence

This area is identified as high risk because of the likelihood of an existing reproductive JB population. Based on the IDW analysis it is probable that 1.01 to 135 JB per trap could occur. Recommendations by the peer review panel at Ohio State University are that this area should receive a turf treatment and multiple foliar treatments to facilitate eradication of the JB. Turf will be treated with Merit® 2F at 1.6 pints per acre starting at the end of June or the beginning of July. The treatment will be applied to all turf, flower beds, ornamental plantings, bare soil, etc. The foliar applications would begin at the first detection of an adult JB in the delimiting grid and be repeated every 10 - 14 days during peak adult flight. Foliar applications will consist of two treatments; Carbaryl will be used for the foliar treatments on

food crops, and Tempo SC Ultra will be used on non food plants. The estimated treatable area for the foliar and turf in 2008 is 267 acres.

## Tier 2: Low Probability of JB Occurrence

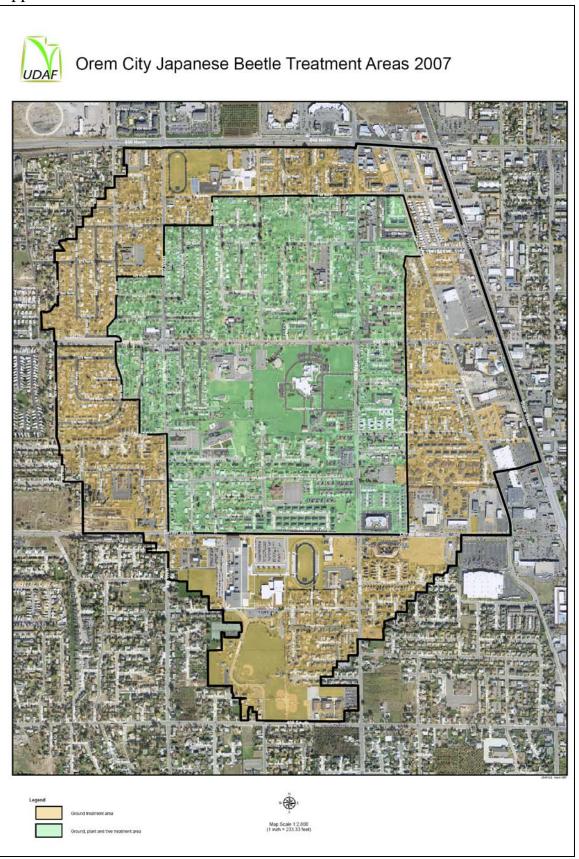
These areas consist of 2007 turf treatment areas that had 0 or 1 beetles per trap. Recommendations by the peer review panel included continued trapping in these areas and treatment if a female JB occurs in the traps. Based on the studies published in Arthropod Management Tests (1976-2005) Merit at the rate of 0.3 lbs of active ingredient per acre is effective against JB larvae in July.

### Gardening Recommendation

Due to the excellent participation by the Orem public in 2007, it has been recommended by the peer review panel to lift the gardening ban. In order to reduce the risk of JB in gardens it is suggested that Utah State University Extension address the topic of mechanical and cultural controls to minimize JB presence in garden areas.

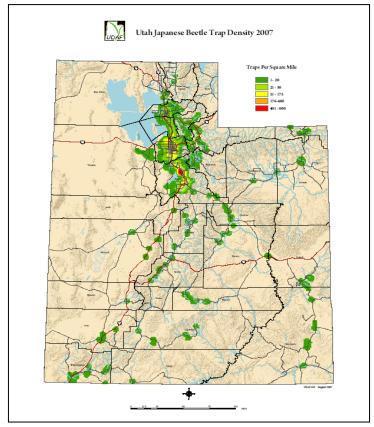
### 2008 Japanese beetle Trapping Program

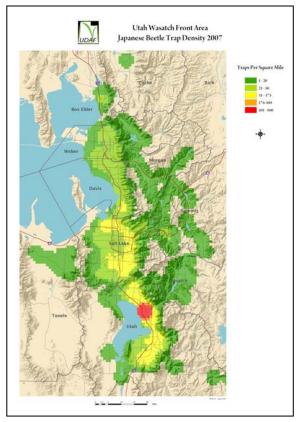
For the 2008 trapping program, UDAF plans to continue both detection and eradication programs. Proposed changes will increase the 250' foot grid trapping area by 50% to cover the 2007 treatment area. Outside of the grid area in Utah County, 5 traps per square mile will be placed and the rest of the state will receive 2 traps per square mile. All detection traps will be staggered from the previous trap location to increase overall trapping coverage. Trap totals for 2008 are estimated to be just over 3000 traps placed statewide. Grid traps will once again be monitored twice a week for weekly totals and all other traps throughout the state will be checked monthly.



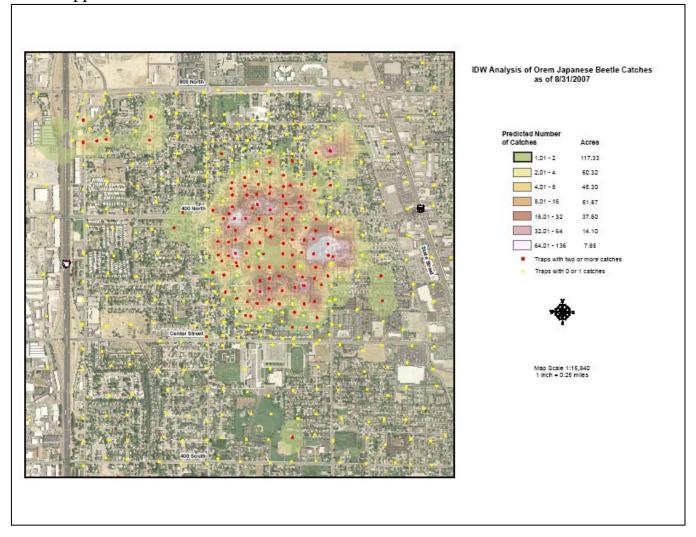
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# Appendix 2





# Appendix 3



## Appendix 4

